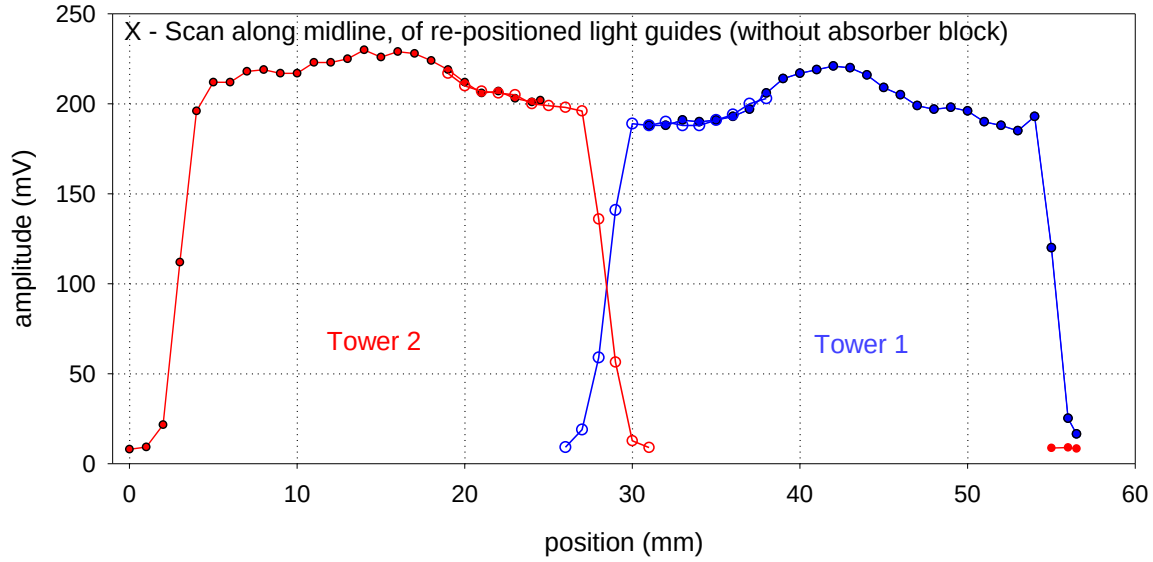
Light Guide Status and Uniformity

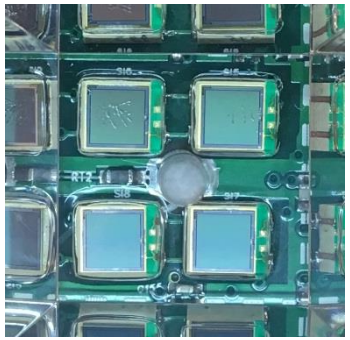
EMCal Workfest Aug 11, 2016

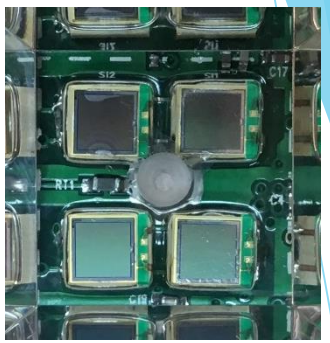
Prototype Issues:
Asymmetry / non-uniformity

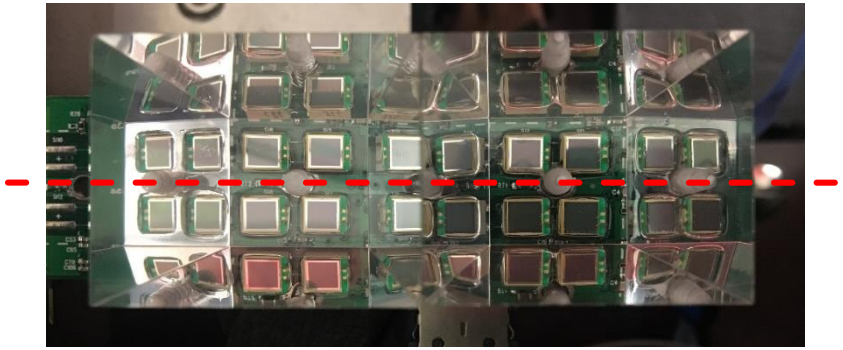
- Observed asymmetry in the light collection/response appears to be due to a lateral offset of the light guide relative to the sipms. When the light guides are better centered on the sipms, the response becomes more symmetric, but there is still some remaining non-uniformity. Possibly due to positioning of sipms (6mm x 7mm) or light guide dimensions (26.3mm x 23.3 mm)?

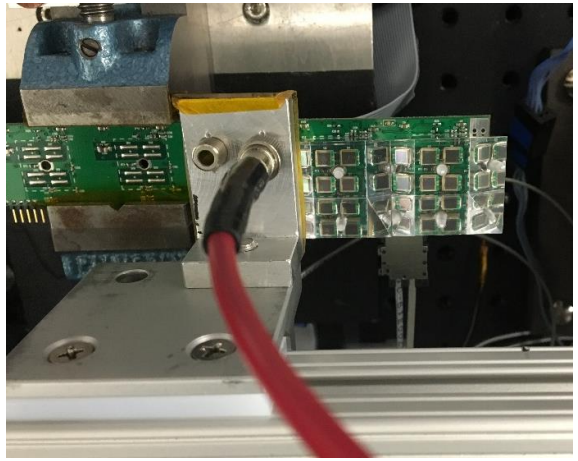


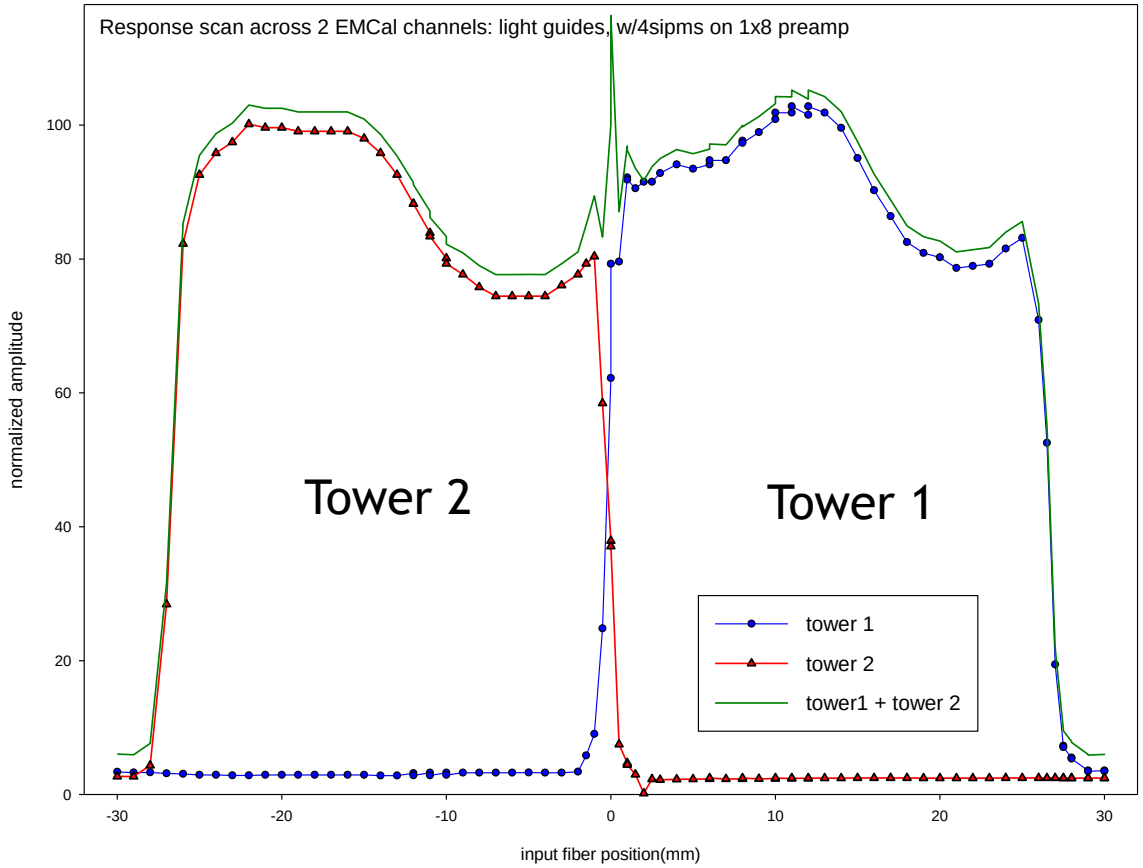
Scan along central axis of 2 light guides, along 1x8 preamp board axis, to characterize gap between LG's. 420nm LED / 0.6mm diam fiber ~ 0.5mm from LG surface



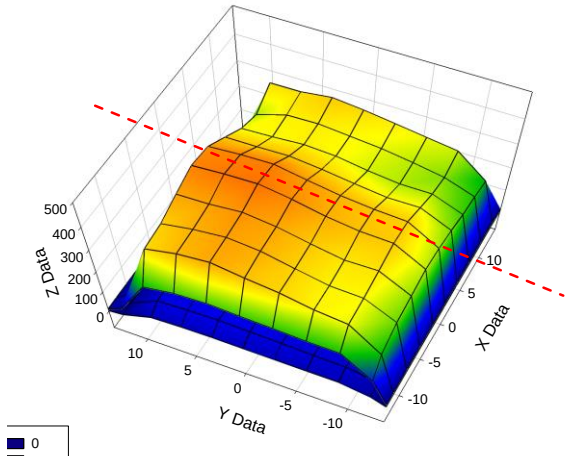


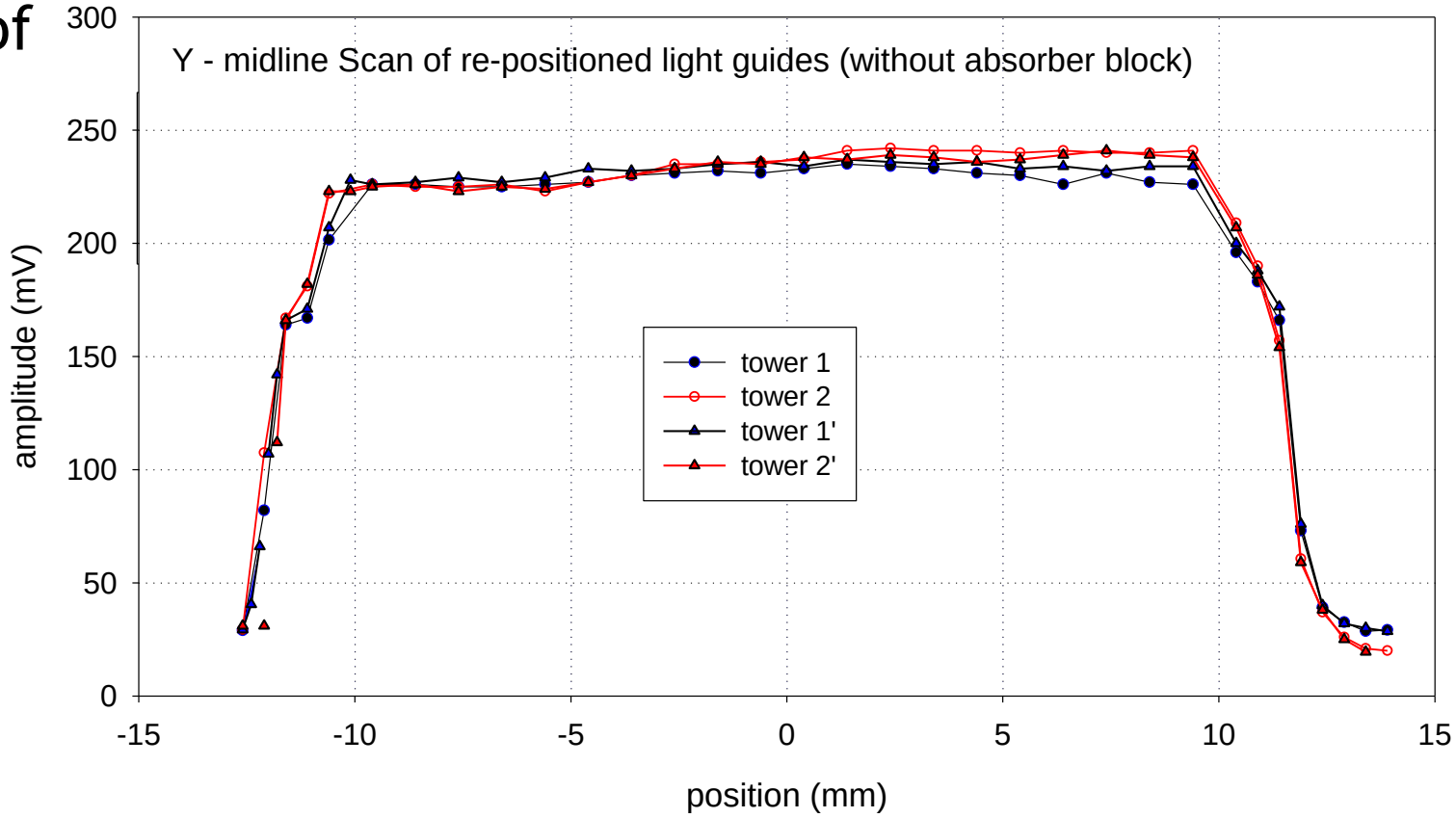




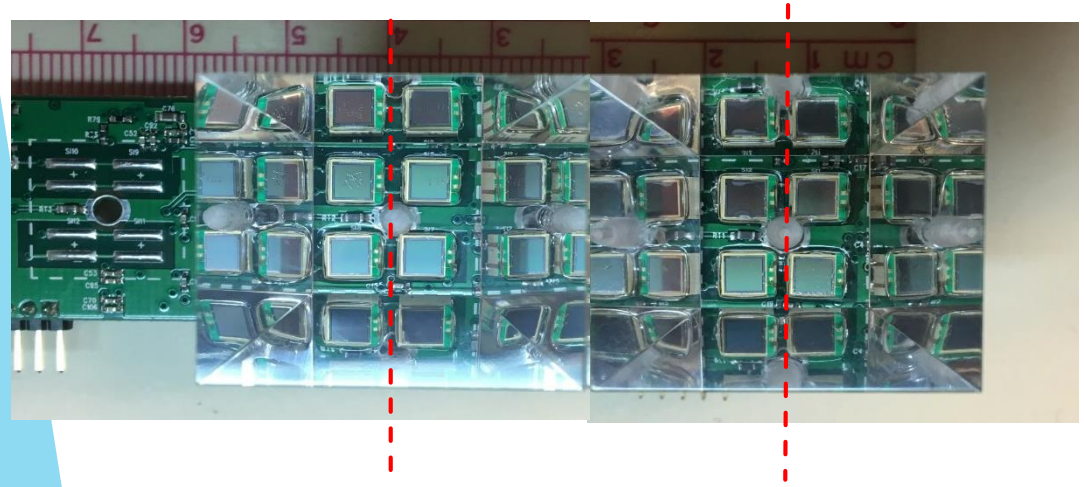


Scan along “Y” axis centerline of Light guides/towers

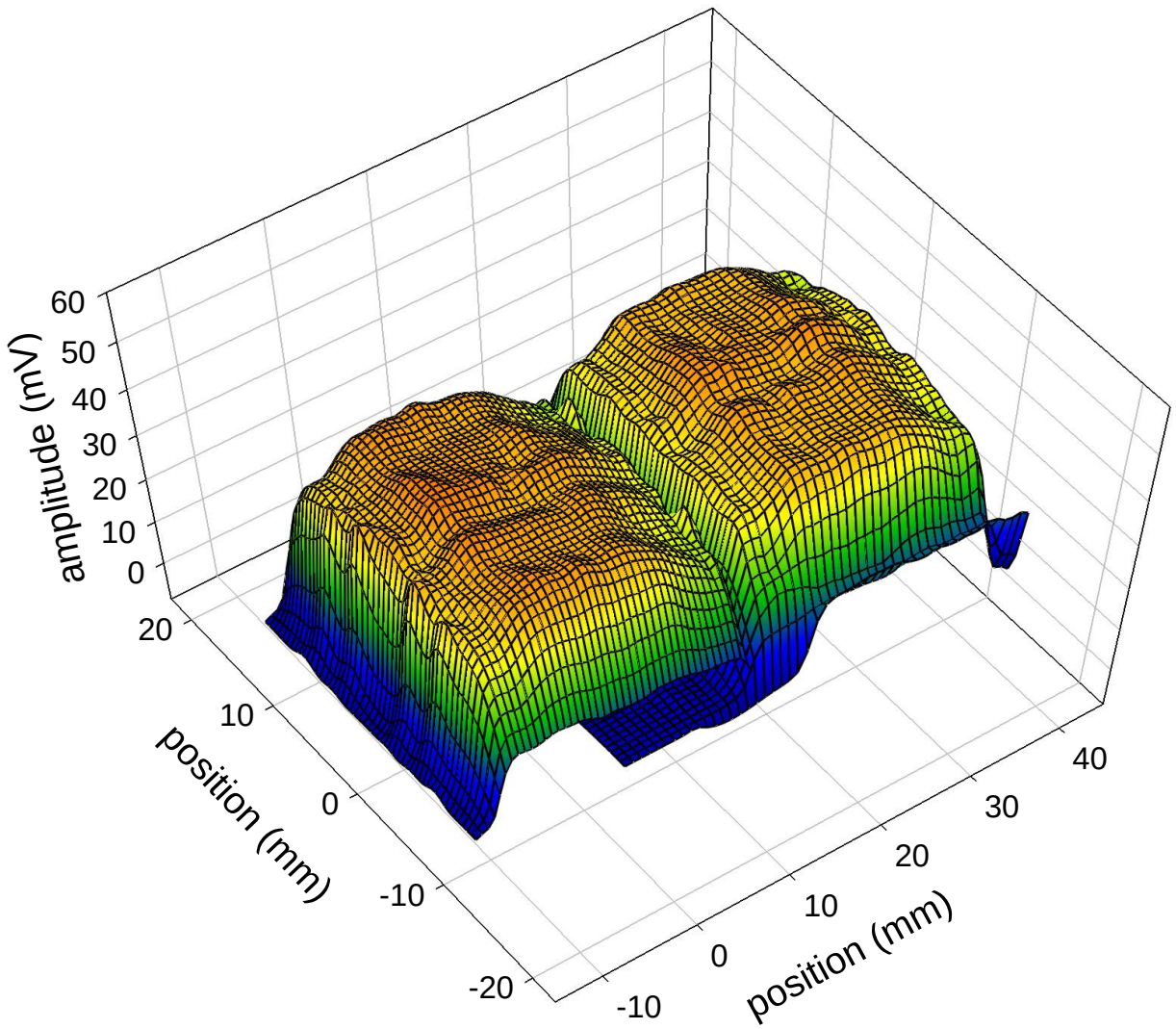


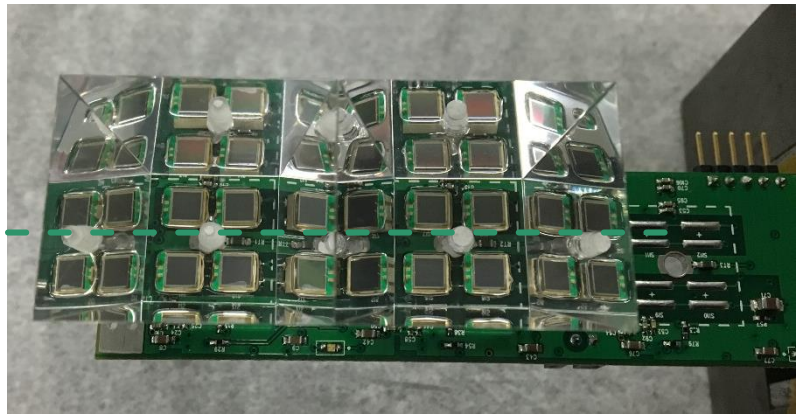


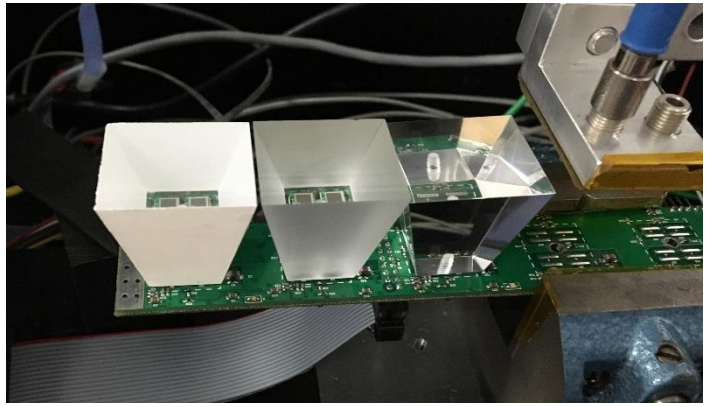
Tower 2 Tower 1

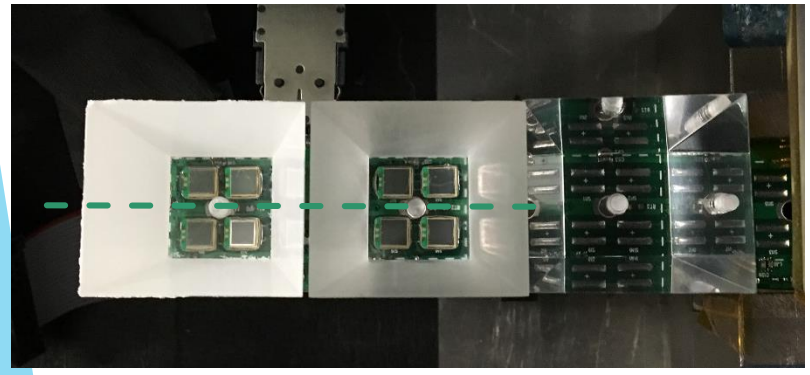


response map acrylic LGs
0.47mm fiber

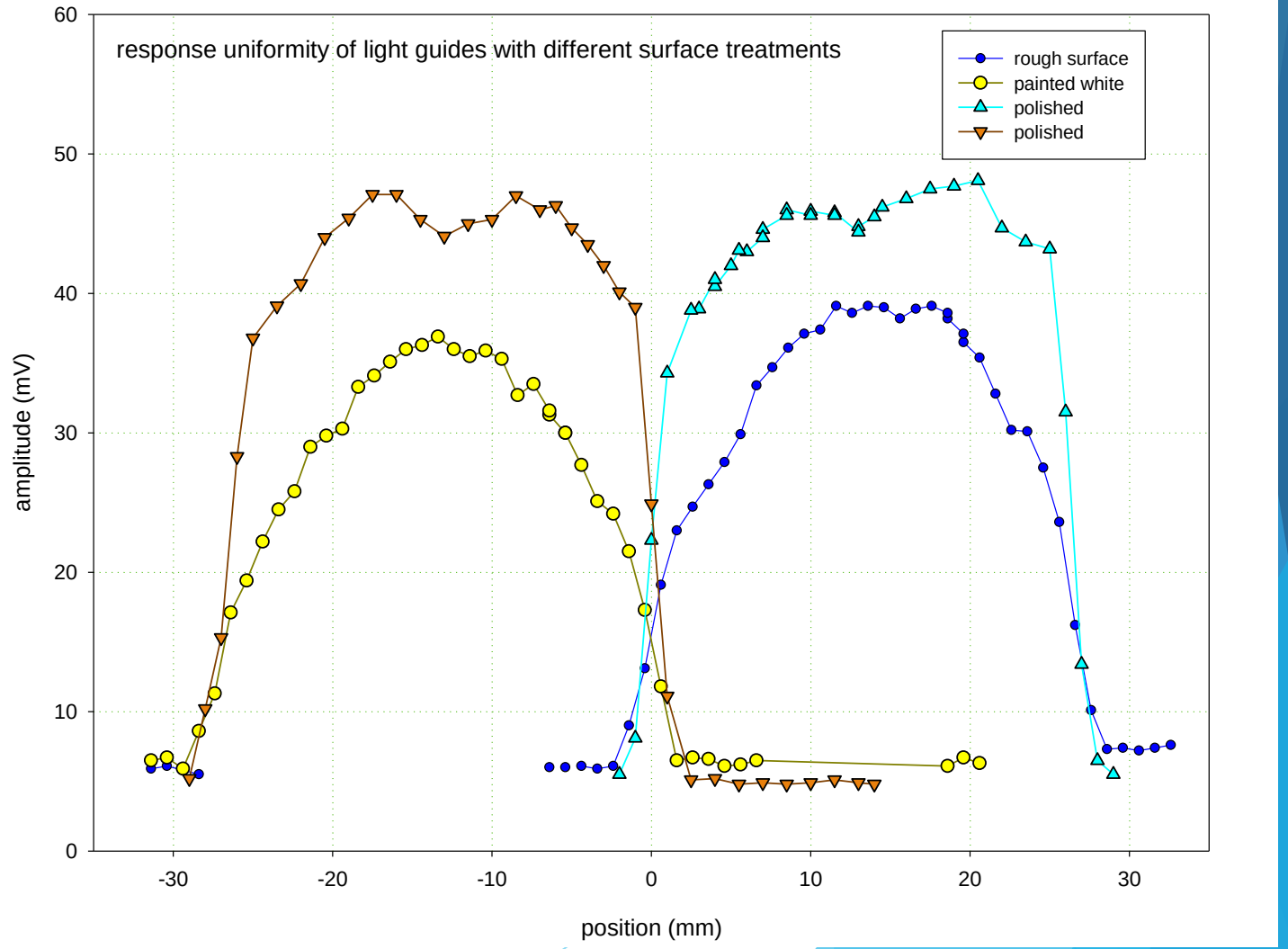








Effect of Surface treatments on response



Design and Production

We have been refining the design, and considering implications of the 2D projective tower design:

Do we then need 24 different LG assembly shapes?

Constraints -

- machined (arc'ed) planar surface on readout surface of 2x8 module
- planar preamp pcb
  daughter cards for sipms? 1 card/2x2 block
- cooling?
- attaching pcbs to light guides – center screw?

Manufacturing of light guides:

- Spoke with plastics manufacturing companies about injection molding of light guide assembly (2x8)
- ProtoLabs, Natech Plastics, Hansa Plastics
- Some issues with process/design:
  - Material thickness may cause deformities as acrylic cures
    - alternative material? silicone?
  - Size/complexity of part/mold – would be easier to make individual towers, possibly multiple shapes in one mold.
  - Initial quote from ProtoLabs - $6.70 per piece for ~1200 2x8 pieces
- We have also started working on casting our own 1 – tower LGs